

### **REMARKS**

Claims 1-24 remain pending. Applicants amend independent claims 17 and 24 to improve the readability of the claims. No new matter is added by way of the amendments, which are fully supported by the specification.

### **Claim Rejections under 35 U.S.C. § 103(a)**

The Examiner rejected independent claims 1, 9, and 17 under 35 U.S.C. § 103(a) as being unpatentable over the Applicants' Admitted Prior Art (AAPA) in view of Apelgren et al. (U.S. Patent No. 6,315,637). Further, the Examiner rejected independent claim 24 under 35 U.S.C. § 103(a) over the AAPA, Apelgren et al., and Yoon (U.S. Pub. 2002/0090784). Finally, the Examiner rejected the dependent claims over combinations of the AAPA, Apelgren et al., and Yoon. Applicants respectfully traverse the rejections.

Apelgren et al. teaches *photoresist removal* using a polishing tool. See Title and Figure 7. Specifically, the reference discloses a wafer with a photoresist and positioning the photoresist in contact with a polishing pad of a polishing tool to remove the layer of photoresist. See Figure 7 and Summary of the Invention. The reference further teaches, "care must be taken" when using materials having relatively low dielectric constants ("k") because "such low-k materials may not be stable enough to withstand subsequent processing." See column 2, lines 2-8. Further, the reference discloses that "ashing processes" may damage the dielectric layer. See column 2, lines 13-15. However, in attempting to overcome the problems defined by the reference, Apelgren et al.'s solution is to position "the layer of photoresist formed on the wafer in contact with the polishing pad of the polishing tool." Column 4, lines 54-56. Thus, to remove photoresist, the reference teaches rotating a polishing pad and applying "downward force" by the polishing arms holding the polishing pad. Column

5, lines 4-10. Accordingly, Apelgren et al. teaches away from the claimed ashing operation to remove the photoresist layer because Apelgren et al. teaches that an ashing process damages a low k dielectric layer.

Moreover, after the reference teaches that an ashing process damages a low k dielectric layer, the reference teaches the use of chemical mechanical processing (CMP), which is a mechanical process for removing photoresist. In contrast, the claimed invention recites an ashing operation in order to prevent damaging the low k dielectric layer when removing the photoresist. Further, Apelgren et al. teaches that any remnants of the photoresist layer are removed with a “megasonic type scrub process” after the CMP operation with the polishing pad. Column 5, lines 23-30. The teaching of a megasonic type scrub process does not teach or suggest the scrubbing of a low k dielectric to remove etching and ashing residues. Specifically, the reference teaches the megasonic type scrub process *after CMP* and *not after the ashing operation*. Thus, the reference does not teach or suggest scrubbing the low k dielectric layer to remove etching and ashing residues *after the ashing operation*.

The Office also offers Yoon to show a surfactant and a cleaning chemistry. However, Yoon teaches a method of manufacturing a semiconductor device to prevent a plate-shaped defect generated during etching and to solve a lateral undercut problem. Column 2, paragraphs 17 and 18, and Abstract. One of ordinary skill would not be motivated to combine Yoon with Apelgren et al. because the claimed invention is directed toward methods of cleaning a semiconductor wafer and Yoon is *solving a defect problem* in semiconductor manufacturing.

Because Apelgren et al. singly or in combination with Yoon does not teach or suggest a brush for scrubbing etching and ashing residues off a wafer after an ashing operation that removes a photoresist layer, Applicants respectfully submit that Apelgren et al. cannot be

Application No. 10/033,644.  
Non-Final Office Action mailed 2/18/04.  
Response to Non-Final Office Action mailed 5/18/04.

combined with Yoon to render Applicants' claimed invention unpatentable over 35 U.S.C. § 103(a). Accordingly, Applicants submit that independent claims 1, 9, 17, and 24 are allowable and that dependent claims 2-8, 10-16, and 18-23 are allowable for at least the same reasons.

If the Examiner has any questions, please contact the undersigned at (408) 749-6900, ext. 6911. Further, if any fees are due in connection with filing this amendment, the Commissioner is authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P316). A copy of the transmittal is enclosed for this purpose.

Respectfully submitted,  
MARTINE & PENILLA, LLP



Feb Cabrasawan  
Reg. No. 51,521

710 Lakeway Drive, Suite 170  
Sunnyvale, California 94085  
(408) 749-6900  
**Customer No. 25920**